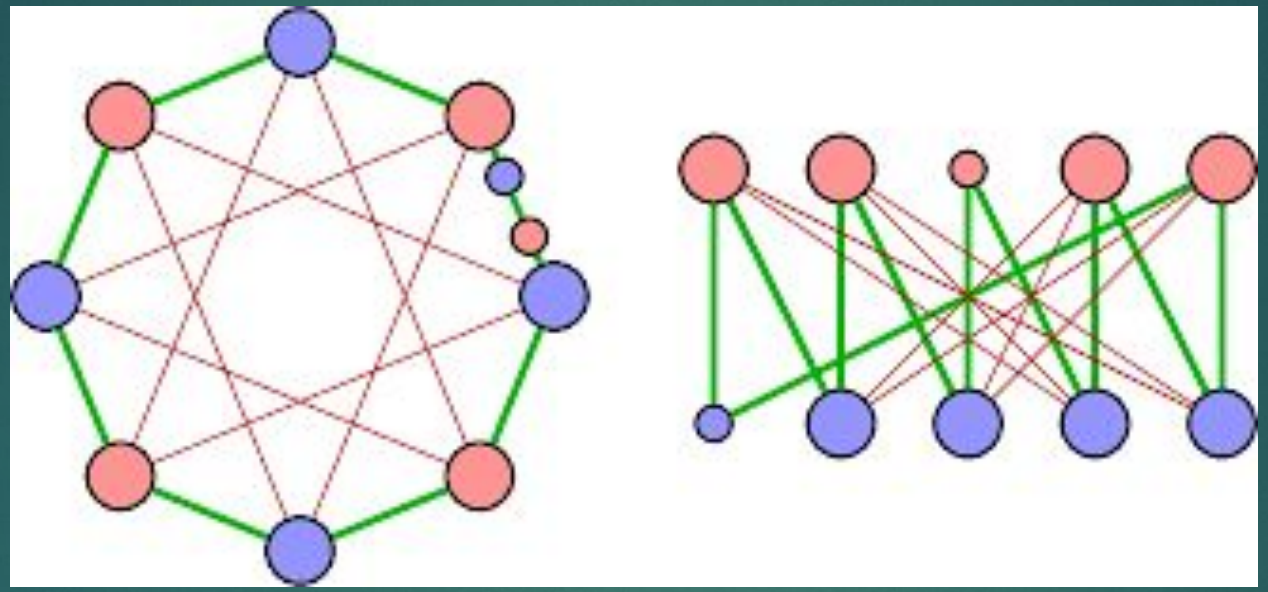
IT-205, Discrete Structure

Hamiltonian and Euler Circuit, Graph colouring



Submitted By:-

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SUBMITTED TO:-

PROF. Swati Sharda

DEPT. OF INFORMATION TECHNOLOGY

CERTIFICATE

This is to certify that Sumit Samdarshi and Yakshit Bansal Roll No : 2K19/IT/127 & 2K19/IT/146 , Information Technology, Delhi Technological University, Delhi have successfully completed the project work entitled “Euler and Hamiltonian Circuit, Graph Coloring” the 3rd semester Innovative project under the guidance of Prof Swati Sharda.

Place: Delhi

Prof. Swati Sharda

Date: 01-12-2020

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to our supervisor Prof Swati Sharda for her invaluable guidance and suggestions throughout the course of this project .

We are also very thankful to our college to have given us this opportunity to do this wonderful project.

Place: Delhi

Prof. Swati Sharda

Date: 01-12-2020

Aim of Project

To Build an App to check:

- Hamiltonian Path (if exist)
- Euler path And Circuit (if exist)
- What is the Chromatic number of the graph.

Application of the Concepts

The application of the chosen topics are applied in various solutions across different fields.

Hamiltonian path find its application in fields like computer graphics, electronic circuit design, mapping genomes, and operations research.

There are many useful applications to Euler circuits and paths. In mathematics, networks can be used to solve many difficult problems, like the Konigsberg Bridge problem. They can also be used to by mail carriers who want to have a route where they don't retrace any of their previous steps. Euler circuits and paths are also useful to painters, garbage collectors, airplane pilots and all world navigators, like you!

For graph coloring, like Making schedule on Time Table, Mobile Radio Frequency Assignment, Sudoku, Register Allocation, Bipartite Graphs, Map coloring.

Algorithm used

- Fleury's Algorithm for printing Eulerian path

- Backtracking Algorithm for printing Hamiltonian path and finding Chromatic number

App Building

Programming the app:
Language used: Dart language
Purpose : For programming the layout, visual changes and connecting with the backend program.

Programming For Concept Application
Language Used: Python
Purpose : Writing the code to check for different parameters for the given graph.

App Hosting Platform: Flutter

Additional features used: API

Why Flutter?

High productivity. Since Flutter is cross-platform, you can use the same code base for your iOS and Android app.

Great performance. Dart compiles into native code and there is no need to access OEM widgets as Flutter has its own. This means less mediated communication between the app and the platform.

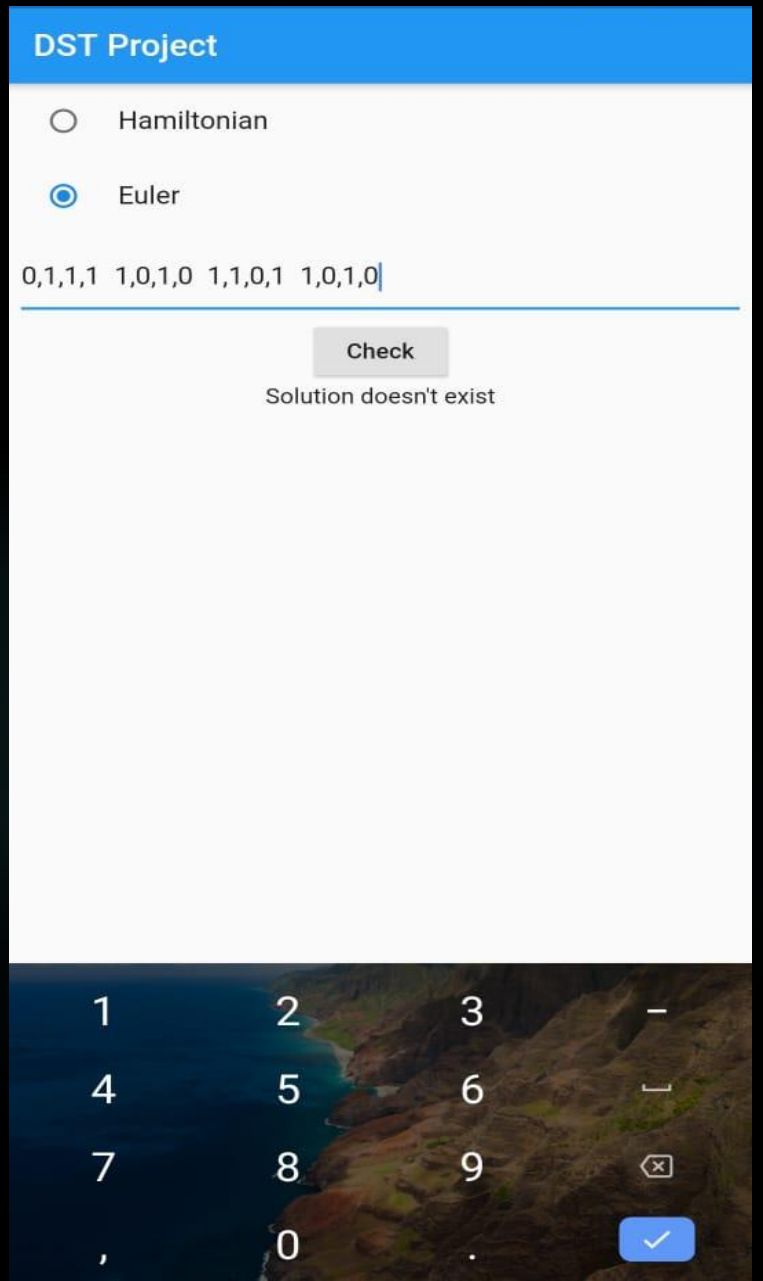
- **Fast and simple development**. One of the most lauded features of Flutter is *hot reload* which allows you to instantly view the changes made in the code on emulators, simulators and hardware.
- **Compatibility**. Since widgets are part of the app and not the platform, you'll likely experience less or no compatibility issues on different OS versions. This in turn means less time spent on testing.
- **Open-source**. Both Flutter and Dart are open-source and free to use, and provide extensive documentation and community support to help out with any issues you may encounter.

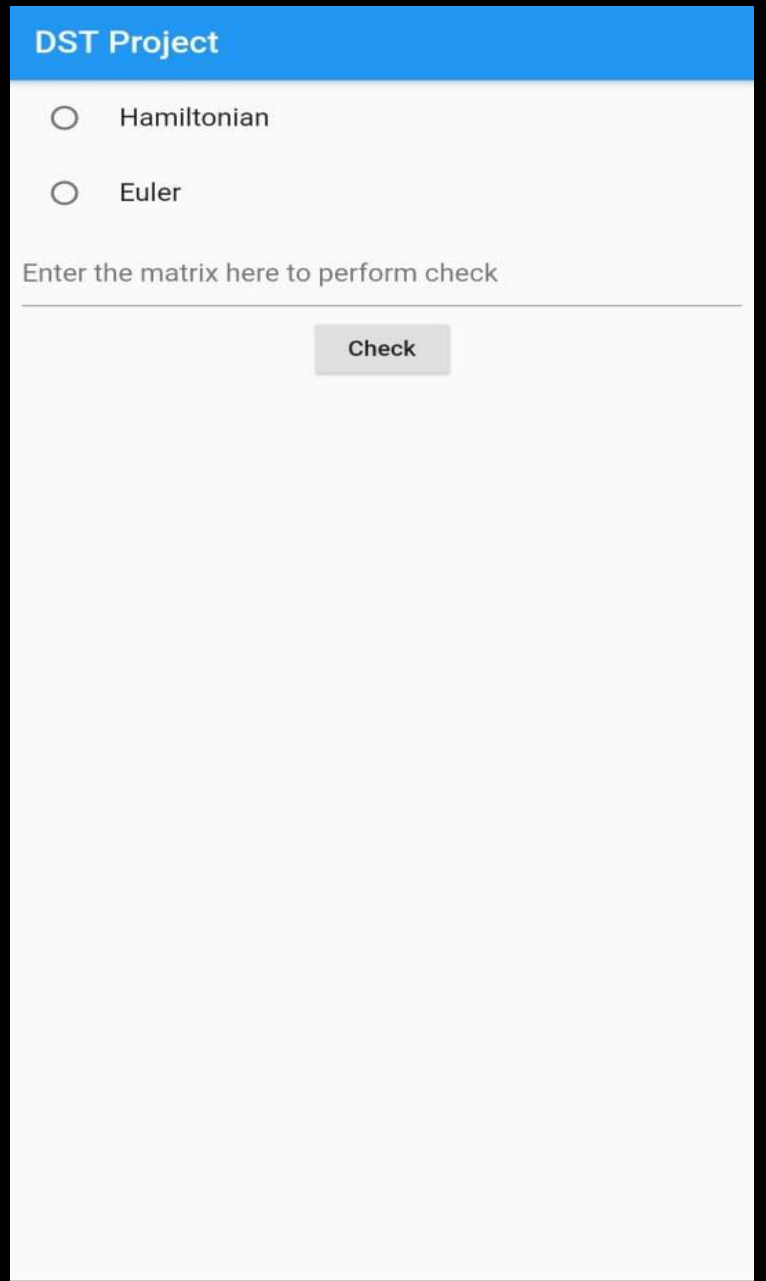
Why is there the need to use API and Plugins?

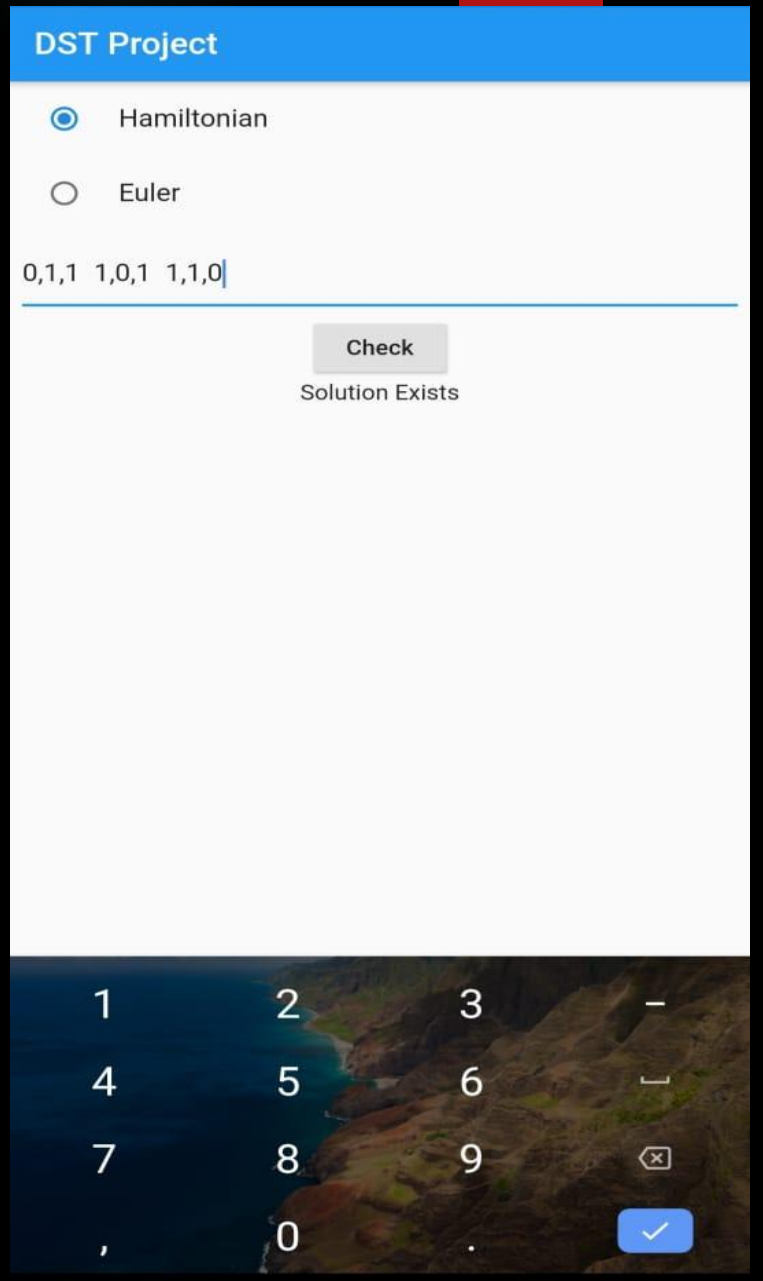
Currently, our App will require the graph entry in the form of adjacency matrix.

But dealing with 2 dimensional or multi-dimensional matrix in dart is a cumbersome process and programming becomes difficult.

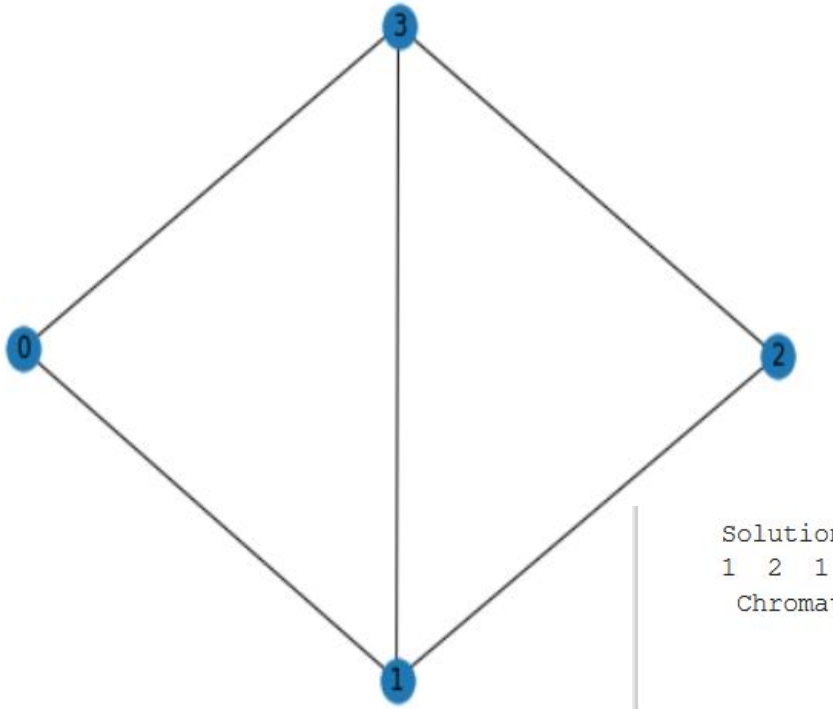
So, to overcome the issue we will be programming the concepts in python and after creating an API based result from the program, we will launch an HTTP request from the dart language to deal with the results.


DST Project
Hamiltonian
Euler
0,1,1,1 1,0,1,0 1,1,0,1 1,0,1,0
Check
Solution doesn't exist


DST Project
Hamiltonian
Euler
Enter the matrix here to perform check
Check


DST Project
Hamiltonian
Euler
0,1,1 1,0,1 1,1,0
Check
Solution Exists

Euler path: [(1, 0), (0, 3), (3, 1), (1, 2), (2, 3)]

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[0, 1, 2, 3]
[0, 1, 3, 2]
[0, 3, 1, 2]
[0, 3, 2, 1]
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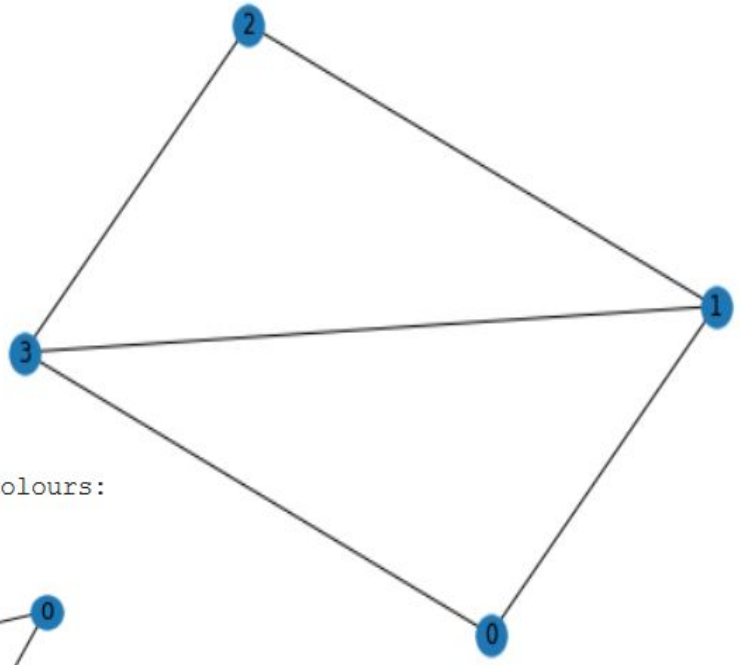


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Solution exist and Following are the assigned colours:
1  2  1  3
 Chromatic Number of Graph is: 3
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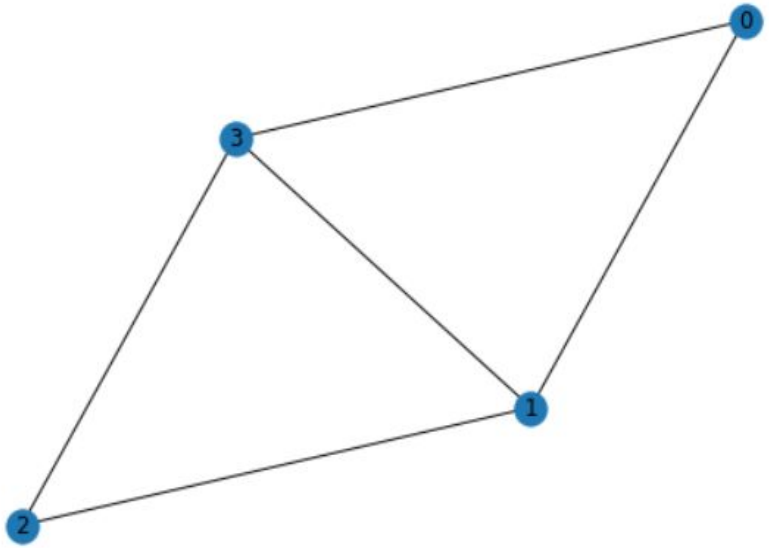

Thankyou